**State of California**
**Department of Fish and Game**

# M e m o r a n d u m

**Date:** August 21, 2008

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**Subject:** Pehl Mine Conditional Use Permit.
Paso Robles, San Luis Obispo
DRC2005-00027

This memorandum presents my comments and recommendations on the proposed Pehl sand and gravel mine on the Salinas River near the intersection of North River Road and Wellsona Road. The proposed mining operation will excavate from the active river channel an annual maximum of 80,000 cubic yards of sand and gravel during summer months when surface water is not flowing across the mine extraction area. The proposed method of mining will effectively excavate a long, wide, irregular shaped trench in the floodplain outside of the current active channel to an apparent maximum depth of 5 feet below the "elevation surveyed and recorded of 638 feet msl," (see Revised Project Description in the February 21, 2008 Mitigated Negative Declaration (MND)). In addition, there are several other setback conditions that will control the extent of excavation. These are partially summarized in Table 2 on page 10 of an August 22, 2006 Sierra Delta Corporation letter to Deborah Hillyard of the Department of Fish and Game (DFG). The footnote in Table 2 also specifies that excavation will be done from August 1 to November 1 with a footnote modifying this to as early as April 15th based on biological surveys. The MND lists on page 21 under the biology mitigations some, but not all, of the setbacks given in Table 2 and adds others; a 20-foot setback from the property line and a 30-foot setback between the "active" channel and mine excavation (page 33).

The issues raised in this memorandum need to be addressed in the CEQA document prepared for the project so that the Department of Fish and Game (DFG) can determine that the proposed

project's anticipated environmental impacts will be adequately mitigated. The mitigation measures can then be incorporated into the Streambed Alteration Agreement.

These comments are based on my review of documents provided by the County of San Luis Obispo, their consultant Balance Hydrologics, Inc., and the applicant's geotechnical consultant Sierra Delta Corporation. I was unable to conduct on site observations for this review as a scheduled site visit to the proposed mine site for field observations was cancelled by the project's applicant. This document is divided into three parts. The first part provides my comments on the technical information submitted by the applicant. The second part discusses general issues with the proposed mine that will need to be addressed via the CEQA process, and reflected in County's permit and the Streambed Alteration Agreement. The third section provides my recommendations for monitoring requirements and suggested mitigation measures to incorporate into the County's permit and the Streambed Alteration Agreement.

**Review of Technical Documents Submitted**

The applicant's geotechnical consultant, Sierra Delta Corporation (SDC), has produced the following four technical documents in support of the proposed instream mine project:

> Anticipated Geomorphologic Effects of In-Stream Mining in the Salinas River, 6225 North River Road, Paso Robles, San Luis Obispo County, California 93446, APN: 026-104-043, dated July 21, 2005;
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> August 22, 2006 Letter to Deborah Hillyard, DFG, Subject: Reply to June 9, 2006 Letter: Comments on Biological Assessment, 6225 North River Road, Paso Robles, San Luis Obispo County CA 93446, APN: 026-104-043, by Stephanie Seay, February 9, 2006, including enclosures A and B;
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> Addendum to Sierra Delta Corporation Engineering Geology Report – Anticipated Geomorphological Effects of In-Stream Mining for the Pehl mine (DRC 2005-00027), Paso Robles, California, dated September 11, 2006; and
>
> Pehl mine gemorphic report supplemental information per items identified by Balance Hydrologics, Inc., dated September 26, 2007.

1. Estimates of river's design flow is presented in Table 1 of Item 3 of the September 11, 2006 SDC addendum report based on central coast regional flood frequency regression equations developed for California by the USGS (Waananen and Crippen, 1997). These curves use three coefficients, including the area of the watershed (A) above the point of interest; the average annual precipitation (P); and an altitude index (H) (see Design Flows calculations in Table 1). The altitude index is defined as the average of altitudes in thousands of feet at points along the main channel at 10 percent, and 85 percent of the distances from the site to the watershed divide. SDC apparently used an elevation of 630 feet (see Item Three) for the altitude index (H), which seems low at approximately 2 feet lower than elevation of the riverbed at the mine site. I would expect that the elevation of the main channel rises upstream of the site such that any average of two elevations would be greater than that of the mine site, producing a higher altitude index, H.

In addition, the exponents for H are negative not positive as shown in Table 1. Therefore, the values calculated for design flows are likely incorrect.

Watson and others (2003) presented in Table 4.1 peak discharges for different recurrence intervals at several gages along the Salinas River including at Paso Robles (USGS gage #11147500), which is approximately 4.5 miles upstream of the Pehl mine. The table below compares SDC regression derived design flows with those of Watson and others. There is a significant discrepancy especially for the flows with less than a 50-year recurrence interval.

Table Comparing Design Flow Discharges, cubic feet per second

| | $Q_{1.01}$ | $Q_2$ | $Q_{2.33}$ | $Q_5$ | $Q_{10}$ | $Q_{20}$ | $Q_{25}$ | $Q_{50}$ | $Q_{100}$ |
|---|---|---|---|---|---|---|---|---|---|
| SDC-Pehl Mine | - | 1,040 | 5,765 | 3,985 | 8,085 | - | 17,093 | 25,719 | 36,496 |
| USGS#11147500 | 101 | 4,709 | - | 11,090 | 15,817 | 20,306 | - | 25,766 | 29,500 |

The recalculation of design flows will likely require additional analysis of the project's impacts and revision of the project's conclusions and mitigation measures may be necessary. For example, Items Six, Seven, Eight and Nine of the September 11, 2007 addendum report discuss the impact of the mining on channel capacity restoration, effects on flooding, anticipated downstream effects, and potential for headcutting. Although no information is presented on the depth or velocity of flows anticipated at the mine excavation area during different flood events, SDC concludes that there is only a limited or low potential for downstream and upstream impacts, and that the mine excavation may locally enhance flood protection. In reaching these conclusions, SDC must have made some estimate of the depth and velocity of flows during floods, taking into account the impacts of past flood events on the mine site and the proposed extent of the mine. A significant upward revision of flood flows as suggested by the Watson and others (2003) report, particularly for the more frequent events ($Q_2$ to $Q_{10}$), would likely change the depth and velocity at the mine excavation during flooding and influence potential project-related impacts.

I recommend that the SDC regression equation-based design flow estimates be redone to reflect the changes and corrections noted above. Following this revision, the revised SDC design flows should be compared to those calculated by Watson and others. Any significant discrepancy between the two methods should be evaluated and explained. The revised analysis should address at a minimum the potential impacts from the mine excavation on channel form, potential for relocation of the channel through the area of mine excavation, and potential downstream and upstream impacts. Any revision of the project's potential impacts, conclusions and mitigation measures should be documented as part of the CEQA process.

2. The September 26, 2007 SDC supplemental report has a discussion in Sections 2.2.1, 2.3 and 2.4 of the sedimentation rate at the proposed mine site. This discussion states that "large-scale recruitment is likely to occur in approximately 3-5 year intervals" and that this will sustain the proposed extraction at the Pehl mine of 80,000 cubic yards per year. The estimate of sedimentation rate on the Salinas River was taken from a study of reservoir sediment deposition conducted in the Santa Margarita Lake (Glysson, 1977) and the Santa Rita Creek basin (Knott, 1976). Based on these studies, SDC concludes that the average rate of sediment deposition to the reservoir over a 34-year period is 1,150 tons/sq.mi./yr. (Section 2.0), and that the Salinas River watershed above the Pehl mine has a similar sedimentation rate. SDC converts this weight-based

sedimentation rate to a volume-based rate, and then uses the value of 1,150 cu.yds./sq.mi./yr. in their sediment budget calculations. SDC estimates that the total annual sediment supply for the 495 sq.mi. Salina River watershed above the mine site is 569,300 cu.yds./yr, and the bedload fraction is 170,800 cu.yds./yr. (see Table 7).

A recent study of sedimentation rates in the Salinas River Valley was published by Watson and other (2003). Watson and others (2003) list in Table 0.4 a range of values for total sediment yield above the Santa Margarita Dam. When the total sediment yield at Santa Margarita Dam provided by Watson and others is converted by dividing by the 290 sq. km. watershed area, the result is a range from a low of 45 metric-tons/sq.km./yr. to a high of 207 metric-tons/sq.km./yr., with an middle valued of 124 metric-tons/sq.km./yr. Using a watershed area of 495 square mile for the Salinas River above the Pehl mine site and converting to US-tons per square mile, produces total sediment yield that ranges from a low of approximately 63,500 US-tons/yr., to a high of 292,000 US-tons/yr., with a middle value of 175,000 US-tons/yr. These total sediment yield values range from approximately 11% to 51% of that calculated by SDC in Table 7. The source of the difference between the two studies of the sedimentation rate in Santa Margarita Lake is not known.

To convert the weight of sediment to a volume of sediment the SDC September 26, 2007 report used a conversion factor of 1.00 ton of sand per cubic yard (see footnote on page 32). This conversion factor seems to underestimate the weight of a cubic yard of sand found in a river bed. According to the Caterpillar Handbook (1995) the weight of damp sand ranges from 1.4 to 1.6 tons per cubic yard, loose and bank (compact and in place), respectively. The weight of sand that will be mined in the river channel is more likely in the range of the Caterpillar Handbook. Therefore the sedimentation rate used by SDC to calculate the Pehl mine's sediment budget should be reduced by approximately 1/3, if a conversion of 1.5 tons per cubic yard is appropriate.

The SDC September 26, 2007 report uses an estimate of 30% bedload fraction to total sediment yield in calculating the mine's sediment budget and cites Watson and other (2003) as the source. An estimate of the range of annual bedload in the Salinas River watershed above the Pehl mine site can be made using the corrections noted above and the sedimentation rates listed by Watson and other (2003) based on sediment trapped by Santa Margarita Dam and the 30% of the total sediment yield being bedload. From the Watson and others Santa Margarita Dam study, the annual bedload above the Pehl mine site likely range from a low of approximately 12,700 cu.yds./yr. to a high of 58,400 cu.yds./yr., with an average of 35,000 cu.yds./yr. These values are all less than the proposed maximum annual extraction rate for the Pehl mine of 80,000 cu.yds./yr. In addition, these values of available bedload at the Pehl mine do not account for extractions by other existing permitted mines or those mines currently being proposed nearby on the Salinas River, which will be discussed below.

If the NOAA criterion for allowing 50% of the sediment load to pass is applied to the Watson and other beloads, then the maximum available bedload at the Pehl mine, without accounting for other mine extractions, ranges from a low of approximately 6,350 cu.yds./yr. to a high of 29,200 cu.yds./yr., with a middle value of 17,500 cu.yds./yr. If the NOAA 50% criterion is applied to the SDC Table 7 bedload fraction, after adjusting for density, an annual volume of bedload available for extraction of approximately 57,000 cu.yds./yr. is calculated. Therefore using either the adjusted SDC or the Watson and others data the estimated maximum bedload available for extraction at the Pehl mine without considering the cumulative effects of other mines is

significantly less than the 80,000 cu.yds./yr. sought by the mine applicant.

It should also be noted that the upstream area from the mine site is given by SDC as 495 sq. miles. The USGS Salinas River gage at Paso Robles, USGS gage # 11147500, which is located approximately 4.5 miles upstream has a drainage area of 390 square miles. The drainage area above the gage at the Santa Margarita Dam, USGS #11144600, is 112 sq. miles. It is not clear from their report if SDC included the watershed area above the dam in the 495 sq. miles area upstream of the Pehl mine site. If they did, then the sediment load trapped by the reservoir should be deducted from the values calculated above. Using the SDC's estimated load rate adjusted for density an annual bedload fraction of approximately 88,000 cu.yds./yr. If the sedimentation rates of Watson and other (2003) are used the annual bedload fraction ranges from 15,000 to 68,000 cu.yds/yr., with an average of approximately 41,000 cu.yds./yr. These values do not take into account NOAA's 50% bypass requirement.

I recommend a re-evaluation of the sediment loads for the Salinas River watershed above the Pehl mine site. An evaluation is needed of the bedload available for extraction at all of the existing permitted mines and currently proposed mines in the Paso Robles area. In particular, analysis is needed to determine: (1) why there is such a large difference between the values calculated by SDC and Watson and other (2003); (2) what impact recalculation of design flows has on sediment supply at the mine; and (3) what the cumulative impacts to sediment load and mine yield from existing and proposed mining upstream and downstream of Pehl mine.

3. In order to begin an assessment of the cumulative impacts from instream mining on the Salinas River and the adjacent tributaries, I compiled a list of the existing permitted mines on the Salinas River near Paso Robles from the database maintained by the Department of Conservation's Office of Mine Reclamation (OMR) and the proposed extraction rates for five additional mines currently seeking permits from the County. The September 26, 2007 SDC supplemental report lists in Table 9 the extraction rates for existing mines on the Salinas River upstream of the proposed Pehl mine have an approximate average annual yield of 90,000 cubic yards. This permitted annual extraction rate was presumable taken from each mine's Conditions of Use Permit and/or Reclamation Plan. The OMR database also lists one additional mine, mine ID #91-40-0040, as idle, which is still a permitted mine, but the annual yield is not include in SDC's table.

   I have attached a Google Earth image of the area around Paso Robles and plotted on it the six existing and five proposed mines on the Salinas River and adjacent tributaries. I matched for the existing mines the mine ID numbers with the mine names given in the SDC report with the latitude and longitude provided in the OMR database and then took the locations of the proposed mines from the submitted Mine Reclamation Plans. The Union Asphalt mine on Huerhuero Creek is not shown because I could not link it to a mine listed by OMR to find its location.

   The estimated annual yield from the existing and proposed mines is tabulated and inserted into the attached figure. The cumulative annual extraction volume of 120,000 cu.yds./yr. from the existing mines is slightly greater than the replenishment rate calculated by SDC, 114,000 cu.yds./yr., and over three times that calculated using Watson and others, 35,000 cu.yds./yr. The cumulative annual extraction rate for permitted mines and the proposed mines is approximately 410,000 cubic yards per year for mines on the Salinas River and 529,000 cubic yards if the adjacent tributaries are included. Thus, the cumulative annual extraction volume for the existing

and the five proposed instream mines in the Paso Robles area is approximately 4 times greater than the density corrected bedload replenishment volume calculated by SDC, and over 10 times the average bedload replenishment calculated using values of Watson and others. This does not take into consideration the NOAA recommended 50% sediment bypass. Clearly, there will be cumulative impacts if the existing operations already exceed the river's replenishment rate and the addition of the Pehl mine's requested 80,000 cu.yds./yr. would well exceed the available supply.

4. The July 21, 2005 SDC document provides in Section 3.4 a discussion of the flood hazard for the project site. This discussion provides a portion of the July 5, 1982 FEMA flood map, Figure 5, with a general outline of the proposed mine site. In a June 9, 2006 letter the County implies that restrictions on the mining activities differ across the mine site and that different portions of the "active" channel have been delineated, i.e., the $Q_{10}$ and $Q_{100}$ zones (see item 3 on page 6 of the June 9, 2006 letter included in Enclosure A of the SDC's August 22, 2006 report). However, no map is provided for the mine site that specifically identifies these flood zones or defines what portion of the operation are within the 100-year floodplain. I recommend that a map be provided showing the boundary of the 10-year and 100-year floodplain and any other flood zones that are relevant to the mine operations and mitigation measures.

5. The operations areas for the Pehl mine will be on a floodplain and terrace on the east side of the Salinas River channel. The mine excavation area is apparently within the 100-year floodplain because the 1969 flood event, a 50-year event at 28,000 cubic feet per minute, inundated the terrace (see Figure 5 of the SDC 2007 report). As discussed above, the SDC report does not indicate the boundary of the 100-year floodplain. The operations area at a higher elevation than the excavation area will contain material stockpiles, storage of heavy equipment, screening and sorting equipment, offices and maintenance materials. It is not known what flood event will inundate the operations area. If it is within the 100-year flood plain then there is a probability of approximately 18% that it will be inundated at least once during the 20 year life of the mine (Bedient and Huber, 2002). If a lesser flood will inundate the operations area the probability goes up to as high as 33% for a at least one 50-year event in the 20-year life of the mine. Inundation of the operations equipment and materials will likely have a direct detrimental impact on the river. The report does not specify whether any operations equipment would be moved if a flood is eminent. If equipment will be moved, or, if moved,where will it be taken.

   Based on the flood plain boundary map recommended above in item 4, I recommend that as much as possible the operations area be established outside of the 100-year floodplain. If that is not feasible, I recommend that additional evaluation and analysis be done on the potential impacts from a flood event that inundates the operations area, that additional mitigation measures be provided as necessary, that the location(s) be identified where the mining equipment and potentially hazardous materials will be taken in the event of a flood, and that mitigation measures be provided for the case where the equipment and potentially hazardous materials can not be removed. I also recommend that specific rainfall/flood event triggers be established for when the inundation mitigations would be implemented.

6. One of the proposed criteria for limiting the depth of mining is the distance between the base of the mine excavation and first ground water. A minimum of 1-foot to ground water has been proposed by the applicant as an appropriate separation. The depth to ground water is proposed to be established each year prior to the beginning of mining using piezometers. The SDC

September 11, 2006 report and the Reclamation Plan recommends that once ground water level monitoring determines a stable water table level has established sufficiently below the final extraction depth, monitoring could be discontinued.

The conclusion that ground water monitoring can be discontinued seems to conflict with the mitigation measure which specifies a 1-foot vertical setback will be maintained. The SDC reports do not provide any site-specific information on the current depth to ground water or impact of any adjacent irrigation pumping on the water levels. There is, however, some indication of the level of ground water provided in the mine cross-section figure included in the September 11, 2006 report and the Reclamation Plan. This figure indicates that high ground water table is at or near the elevation of the river bed. The Reclamation Plan Application in Section H-2 states that highest groundwater was 632 feet on 7/21/2005. The location where this measurement was made is not given, but the river bed is apparently at that elevation west of the extraction area. In addition, the Mine Reclamation Plan indicates that an existing, on-site water well will supply water for the mining operation. The location and design of this production well, its yield rate and its impact on water groundwater elevations in the in the mine excavation area are not discussed.

I recommend that additional discussion be provided on the elevation of ground water, the potential fluctuations and the relationship to the proposed mine excavation. The source of the ground water levels and fluctuations described in the Mine Reclamation Plan should be documented. Once information regarding ground water has been produced, DFG would like to review and provide comments as to the appropriate setbacks. The design of the existing, on-site water well and the potential impact to groundwater elevations in the mine extraction area should be evaluated and mitigation measures proposed, as necessary.

7. The SDC September 26, 2007 report presents their interpretation of a series of aerial photos from 1937 to 2002. The report provides one figure that compares changes in river morphology for three periods since 1937, Figure 12. The report doesn't map the proposed mine excavation or operations areas on the aerial photos and only provides the boundary outline of Pehl mine, leaving it to the reader to interpret how the channel changes relate to the proposed mine.

   I recommend that the mapping of channel features be done on these photos with the proposed mine excavation and operations area shown and produced at a scale that allows for features to be identified. Digital copies of these photos should be made available so that DFG staff can review the findings. A recent aerial photo set, circa 2007 or 2008, should be developed as these photos will be needed to create a pre-mining contour map with a small enough contour interval that can be used to calculate excavation volumes. A contour interval equal to or less than 1 foot should be required.

**General CEQA Issues for the Streambed Alteration Agreement**

The following is a discussion of general issues that relate to the conditions and requirements of the Streambed Alteration Agreement that needs to be further evaluated for the proposed Pehl mine operation. These issues should be addressed by way of the County's CEQA process, to allow DFG as a Responsible Agency, as well as the public, to review and comment.

1. The allowable annual extraction volume is proposed to be calculated at the beginning of each extraction season by comparing elevation surveys taken in the fall at the end of the previous period of mining with the elevation surveys taken in the spring. The concept is that replenishment of sands that occurred during winter runoff will make available new materials for extraction. The allowable extraction volume is modified by several other conditions that include the lifetime maximum depth of 5 feet and a vertical setback of 1 foot to ground water. Other habitat and geomorphic conditions also apply that can modify extraction rates, but the discussion here is only about the elevation surveys. The SDC reports do not specifically discuss the method of surveying, what elevation accuracy will be achieved, what horizontal and vertical datum will be used, how the surveying will combine the use of aerial photos and ground surveys, how often aerial photos will be taken and at what scale, what criteria will be used for placement of the cross-sections, whether they can shift each year as needed, what method will be used for calculating volumes, etc. In other words, the specific channel survey monitoring program methods, goals and application isn't thoroughly presented in the September 26, 2007 SDC report and raises the question of whether the surveying will be able to achieve the objective of obtaining a reasonably accurate measure of the river bed elevations so that an accurate estimate of the volume of sand available for extraction can be made each year, as well as document the impacts of mining.

   A more detailed description of the channel survey monitoring program methods should be provided; in addition, DFG would like to review and comment on the monitoring program prior the County's approval of the project because we would like to have the identical monitoring program incorporated into the Streambed Alteration Agreement.

2. The extraction of sand in the river channel requires that the maximum depth of extraction, as determined in the spring of each year, not be exceeded. The SDC reports do not explain how this maximum depth will be marked in the field so that the equipment operators can readily determine when they have achieved the maximum depth. In grading operations, the depth of cut is typically set, consistent with a benchmark outside of the active mining area, by the surveyor using surveyor's lath that are marked and labeled for the depth of cut. This method allows the operator to determine excavation depth using a hand level to the nearest lath stake.

   Additional discussion needs to be provided on how the maximum depth of excavation will be identified in the field and how equipment operators will know when to stop excavating.

3. The maximum depth of extraction each year is conditioned on maintaining a proposed 1-foot vertical setback from ground water. As discussed above, there is no site specific information on the elevation of ground water relative to the channel surface in the area of the mine, the amount of ground water fluctuation, the cause(s) of fluctuation, or the timing of fluctuations. These issues are apparently left to future study once the mine is approved. The issue of depth to ground water is a critical issue. Information is needed on the pre-mining condition particularly as it relates to the health of the riparian vegetation. The excavation of the mine may cause a lowering of local ground water levels by increasing the potential for evaporation. Even though a foot of soil is proposed to remain above free-standing ground water, the fine sandy soils of the riverbed cause ground water to rise by capillary action which exposes it to high summer surface temperatures that increase the potential for evaporation. As capillary water evaporates, additional ground water raises to the surface and the depth to free-standing ground water may locally increase. The effect of too rapid a drop in water table on the riparian vegetation can be

significant, even when it is only seasonal.

Additional information is needed on the ground water in the channel of the mine area to determine pre-mining conditions and fluctuations so that a baseline condition can be established. Based on this information, proposed setbacks, monitoring requirements, benchmarks and mitigation measures can be developed for inclusion in the County's permit and the Streambed Alteration Agreement, to ensure the health of the riparian vegetation adjacent to the mine site.

4. The September 11, 2006 SDC report indicates that extraction of the sand will have a limited beneficial affect on the event of flooding. The September 26, 2007 SDC report indicates that the there will be a "clear water" area downstream from the extraction area that will produce a small degree of scour. This "clear water" area consists of a series of islands and narrow channels that the floodwaters leaving the excavated area flow through before re-entering the main channel. They state that the proposed mining "will likely initiate this effect upstream of its present locations and further enhance definition of the islands and channels." In other words, the "clear water" will scour out the channel around the islands. The type and degree of "enhancement" to the islands and riparian vegetation are not specified.

   This discussion of effects of "clear water" scour does not account for the potential combined impacts for the proposed Weyrick mine that will apparently be just downstream from the Pehl mine on the other side of the main channel. The discussion of "clear water" impacts assumes that floodwaters will flow across the existing undisturbed flood plain and not another mine's excavation area. The lowering of the flood plain at the Weyrick mine directly downstream may extend the impacts of the "clean water" erosion if and once both mines are operating.

   Additional information and analysis is needed to clarify the apparent conflicts on the potential impacts, both beneficial and detrimental, from excavating sands in the flood plain. Will the increase in channel capacity cause an increase in bank erosion; and if not; why not? What are the downstream effects of the "clear water" on the proposed Weyrick mine? Will the locally increased channel capacity have an impact on flooding downstream, by delivering a higher volume of water in the main channel, rather attenuating and dispersing the flood event?

5. The instream mining operation has a number of constraints that may prevent the mine from extracting sands which may cause the mine to become idle under SMARA. The current CEQA document and technical reports do not address the issue of what changes, if any, will occur in the mining operation should it become idle. The Streambed Alteration Agreement monitoring and mitigations requirements would normally continue as if the mine were active, but will the operator desire to modify the agreement to reflect the mine's idle status? If changes are made, what happens to the modified Streambed Alteration Agreement when the mine becomes active again? If the operator anticipates a need to modify the Streambed Alteration Agreement conditions during idle status, those modifications should be discussed now as a part of the initial permitting CEQA process. Future changes in the monitoring and mitigations for the Streambed Alteration Agreement that have the potential for significant environmental effects may require additional CEQA processing.

**Recommended Mitigations and Monitoring Requirements for Consistency between the County's permit and DFG's Streambed Alteration Agreement**

The issue of our inability to accurately predict the amount of sediment transported down a river each year such that a fixed extraction volume can be permanently set is well known. Therefore, the only alternative to setting a fixed extraction volume is establishing one that adapts year-to-year to conditions on the ground. Adaptive management of instream mining operations requires three types of monitoring: 1) compliance, 2) mitigation, and 3) adaptive management. The following discusses and makes recommendations for monitoring and mitigation measures that should be incorporated into the County's permit and the Streambed Alteration Agreement, and to establish an adaptive management program for the Pehl mine operation.

1. Monitoring the depth of excavation is a critical component for ensuring compliance with the County's permit as well as the Streambed Alteration Agreement. The restrictions on annual and maximum lifetime excavation depth are proposed at 5 feet. It should be noted that these depths are subject to annual re-evaluation of the overall sediment load as discussed above. There are a number of decisions that will need to be made prior to development and implementation of an effective excavation depth compliance monitoring program.
   a. Will elevation measurements and monitoring be done under the direction of the County rather than the mine operator?
   b. What method(s) of surveying will be done and to what accuracy?
   c. How will the equipment operator know when to stop excavating?
   d. What method of grade control will be used?
   e. Will periodic checks be made during excavation to ensure compliance?
   f. When and how will the maximum depth for each extraction season be finalized?
   g. Will DFG be allowed to review and comment on the proposed extraction depth each year?

   These questions as well as those raised above need to be answered in order to develop a adaptive management program to monitor the depth of excavation. The applicant's consultants should develop a site specific comprehensive program for monitoring the depth of excavation and provide it for County, DFG and public review. The approved monitoring program can then be incorporated into the Streambed Alteration Agreement.

2. Measuring the depth to ground water in the river channel is important for compliance monitoring because of the proposed 1-foot vertical setback from ground water and because of the potential impacts to riparian vegetation. The piezometers should be placed within the alluvium of the river channel and not the adjacent bedrock. The elevation of the top of casing should be surveyed at the same time as the spring ground surveying to link them to the same survey datum. In addition, more information is needed on the ground water monitoring network in order to develop an acceptable ground water monitoring program for the County's permit and the Streambed Alteration Agreement.
   a. Where and how many piezometers will be placed?
   b. To what depth will the piezometers be placed?
   c. How often will the depth to ground water in the piezometers be measured?
   d. To what accuracy will measurements be made, (e.g. 0.01 foot)?
   e. Who will take the measurements, the County, the operator, or both?
   f. Will all ground water reading be reported at the end of each period of extraction?

g. Will the reading be done even though excavation is prohibited?
h. For what reasons might groundwater monitoring be stopped?
i. Will ground water be monitored during the post-mining period until reclamation is deemed complete?
j. How will stress to the riparian vegetation be monitored, and what happens when there is evidence of riparian stress?

3. Maintenance of the health and function of the riparian vegetation in and adjacent to the mine site is critical. The excavation of the channel has the potential to significantly impact the riparian. Excavation setbacks and monitoring of wildlife and vegetation are proposed, but addition discussion is needed to address what actions will be taken should the current mitigation measures fail. These actions can be incorporated into the County's permit and the Streambed Alteration Agreement. The following are some specific questions related to actions that will be taken should it become apparent that riparian vegetation is stressed.
   a. How will stress in riparian vegetation be monitored and what studies will be undertaken to determine the cause of stress?
   b. What mitigation measures and monitoring will be implemented should riparian stress be caused by the changes in the depth to ground water, or bank instability?
   c. Who will conduct the monitoring, the County or the operator?
   d. Who will be involved in approving the correct course of action, the County, DFG, others?

4. The excavation of the river flood plain to a depth of 5 feet has the potential to cause erosion of the excavation walls and the banks surrounding vegetated areas if the proposed 20-foot and 10-foot setbacks, respectively, are inadequate. The setback from the banks and vegetated areas should be site specific, and determined in consultation with the County prior to County approval of the project. Setback should be specified as the distance from the base of the bank at the point of contact with the pre-mining channel to any mining activities. DFG should assist the operator in establishing and marking setbacks, at least initially, so that the proper distance is obtain. Additional erosion monitoring and mitigation issues that need to be resolved for the County's permit and the Streambed Alteration Agreement include:
   a. Will the excavation walls and banks surrounding vegetation areas be monitored for erosion and stability on a periodic basis?
   b. If so, what are the thresholds for identifying excess erosion; and when and how often will monitoring occur?
   c. Who will conduct the monitoring, County or operator?
   d. How will the monitoring be documented and reported, photos, written descriptions, maps?
   e. Will DFG be notified when excess erosion has occurred?
   f. What mitigation measures will be implemented should excess erosion occur?

5. The operator's consultants have stated in their technical reports that headcutting and downstream migration of the mine excavation should not be significant. Monitoring and measurement of these potential impacts is critical for compliance with the County's permit and the Streambed Alteration Agreement to ensure that the mine's impacts remain within the approved mine site. Monitoring of channel elevation using surveyed cross-sections and a longitudinal profile is a minimum requirement. In addition, periodic aerial photos should be taken to document the change in channel form upstream and downstream of the mine in areas outside of the ground

surveys. Should ground surveys or photographic data indicate migration of mining effects off the approved mine site additional mitigations should be implemented. These potential mitigations should be described during the permit process and triggers established for when and who will implement them.

6. The volume of material available for extraction will be determined each spring based in part on comparison with floodplain elevations from the previous fall. Other factors include the depth to ground water and wildlife surveys. There are other conditions that may restrict the volume of material excavated. These issues have been discussed above in more detail, but there is still an issue of how to structure the decision making into an adaptive management program. For example, if there is excessive erosion, what process will be used to adjust the mine operations to mitigate the erosion? Will cessation of all or part of the mining be the only action, or are others actions appropriate? The process of implementing an adaptive management program should be discussed at the beginning of the project, rather than later when the need is critical.

7. The operations area for the mine is likely within the 100-year floodplain for the Salinas River, though it is not known if it is feasible to site it outside of this zone. The applicant's consultant reports don't address the issue of what mitigation measures will be implemented should an inundating flood be expected. Will equipment and hazardous materials be moved out of the 100-year flood plain if a large flood event is possible? What conditions will trigger this action? The following issues should be addressed to determine the feasibility of siting mine operations outside of the 100-year floodplain; and if not, removing equipment and hazardous materials from the mine site in the event of a potential flood.
    a. Can the operations area, which typically includes material stockpiles, storage of heavy equipment, screening and sorting equipment, offices, and maintenance materials, be sited outside of the 100-year floodplain?
    b. Will a prediction of rain fall of a set amount over a specific period of time be assumed sufficient to create a large flood event that triggers the need to move equipment and hazardous materials?
    c. Who will provide the precipitation information needed to make the decision?
    d. If so, what are these amounts and times?
    e. Is this equipment removal voluntary, or will the permit specify that it be done?
    f. What if the equipment is not moved in time and the flood impacts the operations?
    g. Will mitigations measures to recover equipment or hazardous material be developed as part of the permit process or wait for the event to occur?
    h. What hazardous materials are being stored at the mine site and in what type of containers?
    i. Can the hazardous materials be easily moved or is special equipment needed?

8. The operations of a mine with heavy equipment and hazardous materials raises the issue of what measures are going to be taken to prevent spills of fuels, lubricants, hydraulic fluids, antifreeze and other hazardous material used in the operations. What spill mitigation measures are proposed to prevent impacts to water quality, wildlife and habitat? The mine operator will have to develop a Storm Water Pollution Prevention Plan, but this document may not cover all accidental spills. Mitigation measures need to be developed for cleaning up a spill within the flood plain and river bed. Cleanup should be immediate and provide complete removal of contaminated soils as well as a determination of whether water quality has been impacted. The County's permit and the Streambed Alteration Agreement should specify a minimum reportable

volume for a spill so that the County and DFG can have an opportunity to evaluate the impacts and the adequacy of the cleanup. The operator should provide a spill prevention and mitigation plan that provides specific actions that will be taken in the event of a spill.

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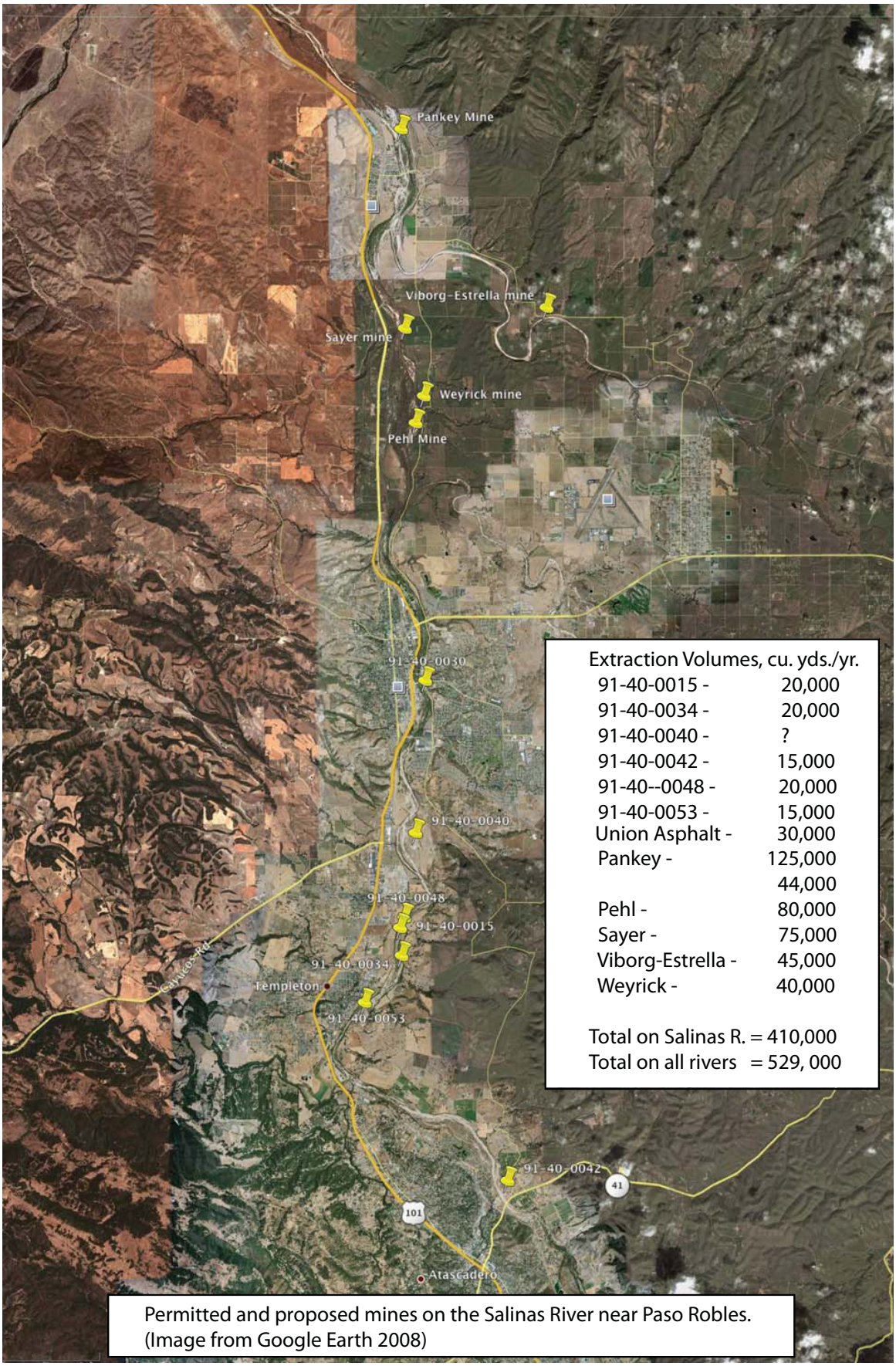


| Extraction Volumes, cu. yds./yr. | |
|---|---|
| 91-40-0015 - | 20,000 |
| 91-40-0034 - | 20,000 |
| 91-40-0040 - | ? |
| 91-40-0042 - | 15,000 |
| 91-40--0048 - | 20,000 |
| 91-40-0053 - | 15,000 |
| Union Asphalt - | 30,000 |
| Pankey - | 125,000 |
| | 44,000 |
| Pehl - | 80,000 |
| Sayer - | 75,000 |
| Viborg-Estrella - | 45,000 |
| Weyrick - | 40,000 |

Total on Salinas R. = 410,000
Total on all rivers = 529, 000

Permitted and proposed mines on the Salinas River near Paso Robles.
(Image from Google Earth 2008)